Q.1) > N=10;N

[1] 10

> n=6;n

[1] 6

> M=5;M

[1] 5

> m=3;m

[1] 3

> set.seed(3)

> sample=sample(1:10,6);sample

[1] 5 7 4 2 3 8

> c5=c(1579.686,2327.025,1354.768,449.099,1229.752);c5

[1] 1579.686 2327.025 1354.768 449.099 1229.752

> c7=c(627.013,408.978,939.460,825.748,87.951);c7

[1] 627.013 408.978 939.460 825.748 87.951

> c4=c(1248.761,612.108,1049.834,282.565,907.700);c4

[1] 1248.761 612.108 1049.834 282.565 907.700

> c2=c(1343.461,54.633,140.582,2.605,40.775);c2

[1] 1343.461 54.633 140.582 2.605 40.775

> c3=c(56.908,100.964,315.809,413.777,1337.852);c3

[1] 56.908 100.964 315.809 413.777 1337.852

> c8=c(553.266,1045.106,99.277,321.583,639.571);c8

[1] 553.266 1045.106 99.277 321.583 639.571

> s1=sample(c5,3);s1

[1] 2327.025 1354.768 1579.686

> s2=sample(c7,3);s2

[1] 408.978 627.013 825.748

> s3=sample(c4,3);s3

[1] 907.700 282.565 1248.761

> s4=sample(c2,3);s4

[1] 1343.461 40.775 54.633

> s5=sample(c3,3);s5

[1] 100.964 413.777 56.908

> s6=sample(c8,3);s6

[1] 321.583 639.571 1045.106

> sm=matrix(c(s1,s2,s3,s4,s5,s6),nrow=6,byrow=T);sm

[,1] [,2] [,3]

[1,] 2327.025 1354.768 1579.686

[2,] 408.978 627.013 825.748

[3,] 907.700 282.565 1248.761

[4,] 1343.461 40.775 54.633

[5,] 100.964 413.777 56.908

[6,] 321.583 639.571 1045.106

> clustermean=apply(sm,1,mean);clustermean

[1] 1753.8263 620.5797 813.0087 479.6230 190.5497 668.7533

> ybar=mean(clustermean);ybar

[1] 754.3901

> sb2=var(clustermean);sb2

[1] 284192.2

> si2=apply(sm,1,var);si2

[1] 259064.56 43455.35 240108.51 559710.08 37858.06 131510.09

> sw2=mean(si2);sw2

[1] 211951.1

> var\_ybar=(((1/n)\*((1/m)-(1/M)))\*sw2)+(((1/n)-(1/N))\*sb2);var\_ybar

[1] 23656.17

Q.2) > N=35;N

[1] 35

> n=10;n

[1] 10

> set.seed(3)

> s=sample(1:35,10);s

[1] 5 12 31 8 20 10 23 32 16 28

> c5=scan("clipboard");c5

Read 13 items

[1] 294179 369198 227461 604608 1279083 696851 462149 249453 630446 224461 762912 1234548

[13] 1444213

> c12=scan("clipboard");c12

Read 13 items

[1] 34705 74595 57065 121750 97614 54995 103575 87430 33146 57543 143478 124994 100227

> c31=scan("clipboard");c31

Read 1 item

[1] 60595

> c8=scan("clipboard");c8

Read 32 items

[1] 1788487 1517390 1673562 1922908 1913099 2990862 2098323 982815 1205631 1116031 1316790 5252388

[13] 2287229 2773894 2880777 507999 1963758 1448486 850756 1819201 2180526 1211343 961269 2009516

[25] 986269 2632210 1107037 1500420 1802656 1568580 1022568 1180342

> c20=scan("clipboard");c20

Read 18 items

[1] 1034151 2092004 790680 2277108 498683 1901564 1161370 1047264 927584 701616 1754571 2394434

[13] 1775961 2783577 364405 1345520 2080265 1978671

> c10=scan("clipboard");c10

Read 37 items

[1] 3043044 3933636 514288 2669887 3570651 1745069 2124831 1294063 2540788 2389533 1524596 1506418

[13] 3285473 3743836 2149343 2708840 3251474 2712389 3413413 2342989 1276677 2430331 1608778 1135499

[25] 801173 525137 2368327 4709851 2233415 1403462 1284575 2448762 1511406 2004960 3464983 1809425

[37] 1397474

> c23=scan("clipboard");c23

Read 45 items

[1] 559715 1587264 1426951 1629881 627818 1440666 1665503 1203160 1474633 854235 2021783 1081909

[13] 1868648 1972333 515851 1572748 1830553 725457 1183369 1214536 1709885 1290230 1306617 1396677

[25] 1740577 2585321 1529954 1081039 1708170 1253246 1214759 1836784 1078769 1120159 1394421 474174

[37] 1085011 1063689 2167469 957399 579312 893908 1848882 1165893 1445760

> c32=scan("clipboard");c32

Read 14 items

[1] 1203342 2412365 786627 2878498 3629640 2617072 2975440 3098378 1128605 1952901 2105349 1231577

[13] 2584118 3234707

> c16=scan("clipboard");c16

Read 4 items

[1] 1530531 762565 307417 590655

> c28=scan("clipboard");c28

Read 23 items

[1] 2479347 2342803 3477079 2662296 3640368 3552762 3506876 3238449 3231174 2565412 2528491 2245103

[13] 3789823 4872622 3796144 4172981 4450956 3054941 2659661 2573481 3512266 3639304 3735202

> M5=length(c5);M5

[1] 13

> M12=length(c12);M12

[1] 13

> M31=length(c31);M31

[1] 1

> M8=length(c8);M8

[1] 32

> M20=length(c20);M20

[1] 18

> M10=length(c10);M10

[1] 37

> M23=length(c23);M23

[1] 45

> M32=length(c32);M32

[1] 14

> M16=length(c16);M16

[1] 4

> M28=length(c28);M28

[1] 23

> m1=round(M5/3);m1

[1] 4

> m2=round(M12/3);m2

[1] 4

> m3=round(M31/3);m3

[1] 0

> m4=round(M8/3);m4

[1] 11

> m5=round(M20/3);m5

[1] 6

> m6=round(M10/3);m6

[1] 12

> m7=round(M23/3);m7

[1] 15

> m8=round(M32/3);m8

[1] 5

> m9=round(M16/3);m9

[1] 1

> m10=round(M28/3);m10

[1] 8

> s1=sample(c5,m1);s1

[1] 249453 1279083 369198 1234548

> s2=sample(c12,m2);s2

[1] 87430 97614 33146 143478

> s3=sample(c31,m3);s3

integer(0)

> s4=sample(c8,m4);s4

[1] 1180342 2009516 1211343 1448486 507999 986269 5252388 982815 1568580 850756 2990862

> s5=sample(c20,m5);s5

[1] 1047264 364405 701616 1754571 1775961 1161370

> s6=sample(c10,m6);s6

[1] 514288 1294063 2389533 2669887 1511406 3413413 1745069 2342989 801173 525137 3285473 2124831

> s7=sample(c23,m7);s7

[1] 559715 1474633 579312 627818 1440666 1214759 474174 1972333 1165893 1426951 1629881 1081909

[13] 1830553 1572748 1394421

> s8=sample(c32,m8);s8

[1] 2617072 1203342 2412365 3629640 1231577

> s9=sample(c16,m9);s9

[1] 590655

> s10=sample(c8,m10);s10

[1] 961269 2098323 1116031 2990862 2773894 850756 2880777 1788487

> mean1=mean(s1);mean1

[1] 783070.5

> mean2=mean(s2);mean2

[1] 90417

> mean4=mean(s4);mean4

[1] 1726305

> mean5=mean(s5);mean5

[1] 1134198

> mean6=mean(s6);mean6

[1] 1884772

> mean7=mean(s7);mean7

[1] 1229718

> mean8=mean(s8);mean8

[1] 2218799

> mean9=mean(s9);mean9

[1] 590655

> mean10=mean(s10);mean10

[1] 1932550

> mean=mean(c(mean1,mean2,mean4,mean5,mean6,mean7,mean8,mean9,mean10));mean

[1] 1287832

> ytotal=N\*mean;ytotal

[1] 45074105

> sb2=var(c(mean1,mean2,mean4,mean5,mean6,mean7,mean8,mean9,mean10));sb2

[1] 504072528810

> v1=var(s1);v1

[1] 301966138575

> v2=var(s2);v2

[1] 2052052047

> v3=var(s3);v3

[1] NA

> v4=var(s4);v4

[1] 1.812918e+12

> v5=var(s5);v5

[1] 316945338962

> v6=var(s6);v6

[1] 986033064757

> v7=var(s7);v7

[1] 227999809065

> v8=var(s8);v8

[1] 1.04808e+12

> v9=var(s9);v9

[1] NA

> v10=var(s10);v10

[1] 793660230209

> sw2=mean(c(v1,v2,v4,v5,v6,v7,v8,v10));sw2

[1] 686206913065

> var\_total=N^2\*((((1/n)\*((1/m)-(1/M)))\*sw2)+(((1/n)-(1/N))\*sb2));var\_total

[1] 5.531439e+13

> se=sqrt(var\_total);se

[1] 7437365

Q.3) > N=100;N

[1] 100

> n=10;n

[1] 10

> M=16;M

[1] 16

> m=4;m

[1] 4

> s1=c(4.31,4.78,3.86,4.02);s1

[1] 4.31 4.78 3.86 4.02

> s2=c(4.61,4.12,3.16,4.12);s2

[1] 4.61 4.12 3.16 4.12

> s3=c(3.72,4.11,4.17,5.70);s3

[1] 3.72 4.11 4.17 5.70

> s4=c(3.75,4.58,3.62,3.78);s4

[1] 3.75 4.58 3.62 3.78

> s5=c(3.12,4.68,3.92,4.32);s5

[1] 3.12 4.68 3.92 4.32

> s6=c(4.08,4.24,4.04,5);s6

[1] 4.08 4.24 4.04 5.00

> s7=c(4.28,4.66,4.04,3.84);s7

[1] 4.28 4.66 4.04 3.84

> s8=c(4.20,4.72,4.96,3.08);s8

[1] 4.20 4.72 4.96 3.08

> s9=c(4.40,4.66,3,4.04);s9

[1] 4.40 4.66 3.00 4.04

> s10=c(4.16,4.24,4.32,4.02);s10

[1] 4.16 4.24 4.32 4.02

> sm=matrix(c(s1,s2,s3,s4,s5,s6,s7,s8,s9,s10),nrow=10,byrow=T);sm

[,1] [,2] [,3] [,4]

[1,] 4.31 4.78 3.86 4.02

[2,] 4.61 4.12 3.16 4.12

[3,] 3.72 4.11 4.17 5.70

[4,] 3.75 4.58 3.62 3.78

[5,] 3.12 4.68 3.92 4.32

[6,] 4.08 4.24 4.04 5.00

[7,] 4.28 4.66 4.04 3.84

[8,] 4.20 4.72 4.96 3.08

[9,] 4.40 4.66 3.00 4.04

[10,] 4.16 4.24 4.32 4.02

> clustermean=apply(sm,1,mean);clustermean

[1] 4.2425 4.0025 4.4250 3.9325 4.0100 4.3400 4.2050 4.2400 4.0250 4.1850

> ybar=mean(clustermean);ybar

[1] 4.16075

> sb2=var(clustermean);sb2

[1] 0.0261959

> si2=apply(sm,1,var);si2

[1] 0.16309167 0.36882500 0.76230000 0.19115833 0.44840000 0.20106667 0.12436667 0.69866667 0.53156667

[10] 0.01636667

> sw2=mean(si2);sw2

[1] 0.3505808

> var\_ybar=(((1/n)\*((1/m)-(1/M)))\*sw2)+(((1/n)-(1/N))\*sb2);var\_ybar

[1] 0.008931022